Space Weather Forecast

From the 24th of September, the way we distribute this forecast is changing and you will need to take action to continue receiving it. You should have received an email on the 4th of September explaining the steps required to do this. If you have already signed up to receive the forecast on our premium website, please disregard this message. If you haven't, or if you need help with the process, please contact moswoc@metoffice.gov.uk

Issued on Thursday, 12 September 2024 at 00:14 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 minor-moderate geomagnetic storm expected on Friday 13 September, slight chance of G3 / Strong storm. Slight chance of S1 minor radiation storm.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with a peak Moderate-class flare a magnetically complex sunspot region, just west of the central meridian, in the northern hemisphere.

There are currently nine sunspot regions on the Earth-facing disc. Most of the active regions are now on the western hemisphere and appear to be relatively simple and stable. The largest and most complex region is location near the central meridian, in the north. This region recently developed a new delta configuration on its intermediate portion, exacerbating its magnetic instability, as can be seen on satellite imagery. The region immediately east of this, appears weaker, with the loss of a couple of spots on its trailing portion. The most significant growth was seen in the newly numbered sunspot region located in the southeast quadrant. This has shown rapid development in the recent hours, and it appears to have a delta spot forming within its large leader spot.

No Earth-directed CMEs have been observed during the period. There is a significant amount of filaments (arcs of plasma) present on the western hemisphere; any lift-off would probably be Earth-directed given their location on the sun.

Solar Wind / Geomagnetic Activity: The solar wind was at mostly background levels. The solar wind fluctuated between 330-400 km/s, despite the late arrival of the 08 Sep CME at 11/1425UTC. The Earth's magnetic field was initially weak, but increased to moderate with the arrival of the weak CME. The north-south component was also weak, but became weakly negative (southward directed) due to CME influence.

The net result of the above solar wind measures was the result of a weak CME arriving at Earth, with geomagnetic activity initially Quiet (Kp1-2), but increased to Unsettled (Kp3) between 11/0900 to 1500UTC, with an Active interval at 11/1500-1800UTC, before returning to mostly Quiet conditions.

Energetic Particles / Solar Radiation: Solar radiation levels (10MeV protons in near-Earth environment) returned to moderate levels, with no solar radiation storm observed.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely to continue throughout, with a daily slight chance of Strong-class flares. The complexity and flare risk of oncoming sunspot regions is likely to exceed that from any departures through midweek UTC, and the overall risk is upwards around this time.

Solar Wind / Geomagnetic Activity: The weak CME (from the 08 Sep) which arrived late on 11 Sep should will soon pass. There is only one Earth-directed CME in the forecast, which was observed leaving the Sun early on the 10 Sept. This is expected to give a direct hit, arriving either late on Day 1 (12 Sep) or early on Day 2 (13 Sep). Any CME influence may also persist into Day 3 (14 Sep), gradually waning. A coronal hole fast wind is likely to arrive by Day 4 (15 Sep), although this is low confidence.

On balance, Quiet to Unsettled conditions should persist for much of Day 1 (12 Sep), followed by an increasing risk of G1-G2/Minor-Moderate Storms early on Day 2 (13 Sep) with a slight chance of G3 / Strong Storm interval. The CME impacts probably lingering into Day 3 (14 Sep), with further Unsettled or perhaps Active intervals. A combination of waning CME influences and the arrival of a coronal hole fast wind, may increase geomagnetic activity to G1 storm level on Day 4 (15 Sep), although this is low confidence.

Energetic Particles / Solar Radiation: A heightened risk of flare activity brings a daily chance of reaching/exceeding the S1 Minor Radiation storm level, should any significant flares occur from active regions in the western hemisphere.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	60	20	5
Strong	G3	No	1	20	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	70	70	70
Very Active	R3 to R5 X	No	10	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	20	20
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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